

**IN THE CLAIMS:**

- 1    1. (Original) A method for creating and maintaining a plurality of virtual servers within  
2    a server, the method comprising the steps of:
  - 3        partitioning resources of the server to establish an instance of each virtual server;
  - 4        and
  - 5        enabling controlled access to the resources using logical boundary checks and se-  
6        curity interpretations of those resources within the server.
  
- 1    2. (Original) The method of Claim 1 wherein the step of partitioning comprises the steps  
2    of:
  - 3        allocating dedicated resources of the server to each instance of the virtual server;
  - 4        and
  - 5        sharing common resources of the server among all of the virtual servers.
  
- 1    3. (Original) The method of Claim 2 wherein the dedicated resources are units of storage  
2    and network addresses of network interfaces of the server.
  
- 1    4. (Original) The method of Claim 3 wherein the common resources are an operating sys-  
2    tem and a file system of the server.
  
- 1    5. (Original) The method of Claim 4 wherein the server is a filer and wherein the virtual  
2    servers are virtual filers (vfilers).
  
- 1    6. (Previously Presented) A method for creating and maintaining a plurality of virtual  
2    servers within a server, the method comprising the steps of:

3           partitioning resources of the server to establish an instance of each virtual server  
4       by allocating units of storage and network addresses of network interfaces of the server to  
5       each instance of the virtual server, and sharing an operating system and a file system of  
6       the server among all of the virtual servers;

7           enabling controlled access to the resources using logical boundary checks and se-  
8       curity interpretations of those resources within the server; and

9           providing a vfiler context structure including information pertaining to a security  
10      domain of the vfiler.

1     7. (Original) The method of Claim 6 wherein the step of allocating comprises the step of  
2       providing a vfstore list of the vfiler context structure, the vstore list comprising pointers  
3       to vfstore soft objects, each having a pointer that references a path to a unit of storage al-  
4       located to the vfiler.

1     8. (Original) The method of Claim 7 wherein the step of allocating further comprises the  
2       step of providing a vfnet list of the vfiler context structure, the vfnet list comprising  
3       pointers to vfnet soft objects, each having a pointer that references an interface address  
4       data structure representing a network address assigned to the vfiler.

1     9. (Original) The method of Claim 8 wherein the step of enabling further comprises the  
2       step of performing a vfiler boundary check to verify that a vfiler is allowed to access cer-  
3       tain storage resources of the filer.

1     10. (Original) The method of Claim 9 wherein the step of performing comprises the step  
2       of validating a file system identifier and qtree identifier associated with the units of stor-  
3       age.

1     11. (Original) The method of Claim 10 wherein the step of performing further comprises  
2       the steps of:

3           for each request to access a unit of storage, using the identifiers to determine  
4   whether the vfiler is authorized to access the unit of storage;  
5           if the vfiler is not authorized to access the requested unit of storage, immediately  
6   denying the request;  
7           otherwise, allowing the request; and  
8   generating file system operations to process the request.

1   12. (Original) A system adapted to create and maintain a plurality of virtual servers  
2   within a server, the system comprising:  
3       storage media configured to store information as units of storage resources, the  
4   units of storage resources allocated among each of the virtual servers;  
5       network interfaces assigned one or more network address resources, the network  
6   address resources allocated among each of the virtual servers;  
7       an operating system having a file system resource adapted to perform a boundary  
8   check to verify that a request is allowed to access to certain units of storage resources on  
9   the storage media, each virtual server allowed shared access to the file system; and  
10      a processing element coupled to the network interfaces and storage media, and  
11   configured to execute the operating and file systems to thereby invoke network and stor-  
12   age access operations in accordance with results of the boundary check of the file system.

1   13. (Previously Presented) A system adapted to create and maintain a plurality of virtual  
2   servers within a server, the system comprising:  
3       storage media configured to store information as units of storage resources, the  
4   units of storage resources allocated among each of the virtual servers;  
5       network interfaces assigned one or more network address resources, the network  
6   address resources allocated among each of the virtual servers;  
7       an operating system having a file system resource adapted to perform a boundary  
8   check to verify that a request is allowed to access to certain units of storage resources on  
9   the storage media, each virtual server allowed shared access to the file system;

10           a context data structure provided to each virtual server, the context data structure  
11   including information pertaining to a security domain of the virtual server that enforces  
12   controlled access to the allocated and shared resources; and  
13           a processing element coupled to the network interfaces and storage media, and  
14   configured to execute the operating and file systems to thereby invoke network and stor-  
15   age access operations in accordance with results of the boundary check of the file system.

1   14. (Original) The system of Claim 13 wherein the units of storage resources are volumes  
2   and qtrees.

1   15. (Original) The system of Claim 14 further comprising a plurality of table data struc-  
2   tures accessed by the processing element to implement the boundary check, the table data  
3   structures including a first table having a plurality of first entries, each associated with a  
4   virtual server and accessed by a file system identifier (fsid) functioning as a first key into  
5   the table, each first entry of the first table denoting a virtual server that completely owns  
6   a volume identified by the fsid.

1   16. (Original) The system of Claim 15 wherein the table data structures further include a  
2   second table having a plurality of second entries, each associated with a virtual server and  
3   accessed by a second key consisting of an fsid and a qtree identifier (qtreeid), each sec-  
4   ond entry of the second table denoting a virtual server that completely owns a qtree iden-  
5   tified by the fsid and qtreeid.

1   17. (Original) The system of Claim 16 wherein the server is a filer and wherein the vir-  
2   tual servers are virtual filers.

1   18. (Original) Apparatus adapted to create and maintain a plurality of virtual filers (vfil-  
2   ers) within a filer, the apparatus comprising:  
3           means for allocating dedicated resources of the filer to each vfiler;

4 means for sharing common resources of the filer among all of the vfilers; and  
5 means for enabling controlled access to the dedicated and shared resources using  
6 logical boundary checks and security interpretations of those resources within the server.

1 19. (Original) The apparatus of Claim 18 wherein the means for enabling comprises  
2 means for performing a vfiler boundary check to verify that a vfiler is allowed to access  
3 certain dedicated resources of the filer.

1 20. (Previously Presented) Apparatus adapted to create and maintain a plurality of virtual  
2 filers (vfilers) within a filer, the apparatus comprising:  
3 means for allocating dedicated resources of the filer to each vfiler;  
4 means for sharing common resources of the filer among all of the vfilers; and  
5 means for enabling controlled access to the dedicated and shared resources using  
6 logical boundary checks and security interpretations of those resources within the  
7 server and for providing a vfiler context structure including information pertaining  
8 to a security domain of the vfiler.

1 21. (Previously Presented) A computer readable medium containing executable program  
2 instructions for creating and maintaining a plurality of virtual filers (vfilers) within a filer,  
3 the executable program instructions comprising program instructions for:  
4 allocating dedicated resources of the filer to each vfiler;  
5 sharing common resources of the filer among all of the vfilers; and  
6 enabling access to the dedicated and shared resources using logical boundary  
7 checks and security interpretations of those resources within the server.

1 22. (Original) The computer readable medium of Claim 21 wherein the program instruc-  
2 tion for enabling comprises a program instruction for performing a vfiler boundary check  
3 to verify that a vfiler is allowed to access certain dedicated resources of the filer.

- 1        23. (Previously Presented) A computer readable medium containing executable program
- 2        instructions for creating and maintaining a plurality of virtual filers (vfilers) within a filer,
- 3        the executable program instructions comprising program instructions for:
  - 4            allocating dedicated resources of the filer to each vfilier;
  - 5            sharing common resources of the filer among all of the vfliers; and
  - 6            enabling access to the dedicated and shared resources using logical boundary
  - 7            checks and security interpretations of those resources within the server and providing a
  - 8            vfilier context structure including information pertaining to a security domain of the
  - 9            vfilier.
- 1        24. (Previously Presented) Electromagnetic signals propagating on a computer network
- 2        containing executable program instructions for creating and maintaining a plurality of
- 3        virtual filers (vfliers) within a filer, the executable program instructions comprising pro-
- 4        gram instructions for:
  - 5            allocating dedicated resources of the filer to each vfilier;
  - 6            sharing common resources of the filer among all of the vfliers; and
  - 7            enabling access to the dedicated and shared resources using logical boundary
  - 8            checks and security interpretations of those resources within the server.
- 1        25. (Previously Presented) Electromagnetic signals propagating on a computer network
- 2        containing executable program instructions for creating and maintaining a plurality of
- 3        virtual filers (vfliers) within a filer, the executable program instructions comprising pro-
- 4        gram instructions for:
  - 5            allocating dedicated resources of the filer to each vfilier;
  - 6            sharing common resources of the filer among all of the vfliers; and
  - 7            enabling access to the dedicated and shared resources using logical boundary checks and
  - 8            security interpretations of those resources within the server and providing a vfilier context
  - 9            structure including information pertaining to a security domain of the vfilier.